

**Claims:**

1. A method of generating a communication frequency based on a modulo 23 solution for an input variable, comprising:

receiving an input variable;

generating an intermediate modulo 23 solution by:

generating a binary representation of said input variable;

using the five rightmost digits of said binary representation of said input variable to

represent a first intermediate remainder ( $R'$ );

using the remaining three leftmost digits to represent a first intermediate quotient

( $Q'$ );

expressing said first intermediate modulo solution as a sum of said first intermediate

quotient ( $Q'$ ) multiplied by 9 plus said first intermediate remainder ( $R'$ ); and

comparing said first intermediate modulo solution to the quantity 32;

indicating said first intermediate remainder ( $R'$ ) as the modulo remainder ( $R$ ) if said

quantity of said first intermediate modulo solution is less than 32; and

using said modulo remainder to generate said communication frequency.

2. The method according to claim 1 wherein an iterative process is performed if said first intermediate modulo solution is greater than 32, said iterative process comprising:

(a) generating a binary representation of said first intermediate modulo solution;

(b) using the five rightmost digits of said binary representation of said first intermediate modulo solution to represent a second intermediate remainder ( $R''$ )

(c) using said remaining three leftmost digits to represent a second intermediate

quotient (Q'');

(d) expressing said second intermediate modulo solution as a sum of said second intermediate quotient (Q'') multiplied by 9 plus said second intermediate remainder (R'');

(e) comparing said second intermediate modulo solution to the quantity 32;

(f) indicating said second intermediate remainder (R'') as the modulo remainder (R) if said quantity of said second intermediate modulo solution is less than 32; and

(g) repeating steps (a) through (f) if said intermediate modulo solution is greater than 32 and continuing until the intermediate modulo solution is less than 32.

3. The method according to claim 1, wherein said multiplication of said first intermediate quotient (Q') by 9 is accomplished by:

shifting said binary representation of Q' to the left by three places; and  
adding said left-shifted value of Q' to the original value of Q'.

4. The method according to claim 2, wherein said multiplication of said second intermediate quotient (Q'') by 9 is accomplished by:

shifting said binary representation of Q'' to the left by three places; and  
adding said left-shifted value of Q'' to the original value of Q''.

5. A method of generating a modulo 79 solution for an input variable, comprising:  
receiving an input variable;  
generating an intermediate modulo 79 solution by:  
generating a binary representation of said input variable;

5 using the seven rightmost digits of said binary representation of said input variable  
6 to represent a first intermediate remainder ( $R'$ );  
7 using the remaining leftmost digits to represent a first intermediate quotient ( $Q'$ );  
8 expressing said first intermediate modulo solution as a sum of said first intermediate  
9 quotient ( $Q'$ ) multiplied by 49 plus said first intermediate remainder ( $R'$ );  
10 and  
11 comparing said first intermediate modulo solution to the quantity 128;  
12 indicating said first intermediate remainder ( $R'$ ) as the modulo remainder ( $R$ ) if said  
13 quantity of said first intermediate modulo solution is less than 128; and  
14 using said modulo remainder to generate said communication frequency.

1 6. The method according to claim 5 wherein an iterative process is performed if said first  
2 intermediate modulo solution is greater than 128, said iterative process comprising:

- 3 (a) generating a binary representation of said first intermediate modulo solution;
- 4 (b) using the seven rightmost digits of said binary representation of said first  
5 intermediate modulo solution to represent a second intermediate remainder ( $R''$ )
- 6 (c) using said remaining leftmost digits to represent a second intermediate quotient  
7 ( $Q''$ );
- 8 (d) expressing said second intermediate modulo solution as a sum of said second  
9 intermediate quotient ( $Q''$ ) multiplied by 49 plus said second intermediate remainder  
10 ( $R''$ );
- 11 (e) comparing said second intermediate modulo solution to the quantity 128;
- 12 (f) indicating said second intermediate remainder ( $R''$ ) as the modulo remainder ( $R$ ) if

said quantity of said second intermediate modulo solution is less than 128; and

(g) repeating steps (a) through (f) if said intermediate modulo solution is greater than 128 and continuing until the intermediate modulo solution is less than 128.

7. The method according to claim 5, wherein said multiplication of said first intermediate quotient ( $Q'$ ) by 49 is accomplished by:

shifting said binary representation of  $Q'$  to the left by 5 places to define a first shifted  $Q'$

value,

shifting said binary representation of  $Q'$  to the left by 4 places to define a second shifted  $Q'$

value; and

adding said first and second shifted values of  $Q'$  to the original value of  $Q'$ .

8. The method according to claim 6, wherein said multiplication of said second intermediate quotient ( $Q''$ ) by 9 is accomplished by:

shifting said binary representation of  $Q''$  to the left by 5 places to define a first shifted  $Q''$

value,

shifting said binary representation of  $Q''$  to the left by 4 places to define a second shifted  $Q''$

value; and

adding said first and second shifted values of  $Q''$  to the original value of  $Q''$ .

9. A system for generating a communication signal at a predetermined frequency, comprising:  
a transceiver, said transceiver comprising:

a radio frequency module;

a baseband core further comprising a frequency control functionality;

5 a frequency hopper within said baseband core of said transceiver, said frequency hopper  
6 being operable to generate a plurality of frequencies related to a modulo 23 solution of an input  
7 variable, wherein said frequency hopper generates an intermediate modulo 23 solution by:

8 generating a binary representation of said input variable;

9 using the five rightmost digits of said binary representation of said input variable to

10 represent a first intermediate remainder (R');;

11 using the remaining three leftmost digits to represent a first intermediate quotient

12 (Q');

13 expressing said first intermediate modulo solution as a sum of said first intermediate

14 quotient (Q') multiplied by 9 plus said first intermediate remainder (R');

15 comparing said first intermediate modulo solution to the quantity 32; and

16 indicating said first intermediate remainder (R') as the modulo remainder (R) if said

17 quantity of said first intermediate modulo solution is less than 32.

1 10. The method according to claim 9 wherein an iterative process is performed if said first  
2 intermediate modulo solution is greater than 32, said iterative process comprising:

3 (a) generating a binary representation of said first intermediate modulo solution;

4 (b) using the five rightmost digits of said binary representation of said first intermediate  
5 modulo solution to represent a second intermediate remainder (R'');

6 (c) using said remaining three leftmost digits to represent a second intermediate  
7 quotient (Q'');

8 (d) expressing said second intermediate modulo solution as a sum of said second  
9 intermediate quotient (Q'') multiplied by 9 plus said second intermediate remainder

(R'');

(e) comparing said second intermediate modulo solution to the quantity 32;

(f) indicating said second intermediate remainder (R'') as the modulo remainder (R) if

said quantity of said second intermediate modulo solution is less than 32; and

(g) repeating steps (a) through (f) if said intermediate modulo solution is greater than 32

and continuing until the intermediate modulo solution is less than 32.

11. The method according to claim 9, wherein said multiplication of said first intermediate quotient (Q') by 9 is accomplished by:

shifting said binary representation of Q' to the left by three places; and

adding said left-shifted value of Q' to the original value of Q'.

12. The method according to claim 10, wherein said multiplication of said second intermediate quotient (Q'') by 9 is accomplished by:

shifting said binary representation of Q'' to the left by three places; and

adding said left-shifted value of Q'' to the original value of Q''.

13. A system for generating a communication signal at a predetermined frequency, comprising:

a transceiver, said transceiver comprising:

a radio frequency module;

a baseband core further comprising a frequency control functionality;

a frequency hopper within said baseband core of said transceiver, said frequency hopper

being operable to generate a plurality of frequencies related to a modulo 79 solution

of an input variable, wherein said frequency hopper generates an intermediate

8 modulo 79 solution by:  
9 generating a binary representation of said input variable;  
10 using the seven rightmost digits of said binary representation of said input variable  
11 to represent a first intermediate remainder ( $R'$ );  
12 using the remaining leftmost digits to represent a first intermediate quotient ( $Q'$ );  
13 expressing said first intermediate modulo solution as a sum of said first intermediate  
14 quotient ( $Q'$ ) multiplied by 49 plus said first intermediate remainder ( $R'$ );  
15 comparing said first intermediate modulo solution to the quantity 128; and  
16 indicating said first intermediate remainder ( $R'$ ) as the modulo remainder ( $R$ ) if said  
17 quantity of said first intermediate modulo solution is less than 128.

1 14. The method according to claim 13 wherein an iterative process is performed if said first  
2 intermediate modulo solution is greater than 128; said iterative process comprising:

- 3 (a) generating a binary representation of said first intermediate modulo solution;
- 4 (b) using the seven rightmost digits of said binary representation of said first  
5 intermediate modulo solution to represent a second intermediate remainder ( $R''$ )
- 6 (c) using said remaining leftmost digits to represent a second intermediate quotient  
7 ( $Q''$ );
- 8 (d) expressing said second intermediate modulo solution as a sum of said second  
9 intermediate quotient ( $Q''$ ) multiplied by 49 plus said second intermediate remainder  
10 ( $R''$ );
- 11 (e) comparing said second intermediate modulo solution to the quantity 128;
- 12 (f) indicating said second intermediate remainder ( $R''$ ) as the modulo remainder ( $R$ ) if

13                   said quantity of said second intermediate modulo solution is less than 128; and  
14           (g)   repeating steps (a) through (f) if said intermediate modulo solution is greater than  
15                   128 and continuing until the intermediate modulo solution is less than 128.

1    15.   The method according to claim 13, wherein said multiplication of said first intermediate  
2    quotient ( $Q'$ ) by 49 is accomplished by:

3           shifting said binary representation of  $Q'$  to the left by 5 places to define a first shifted  $Q'$   
4           value,  
5           shifting said binary representation of  $Q'$  to the left by 4 places to define a second shifted  $Q'$   
6           value; and  
7           adding said first and second shifted values of  $Q'$  to the original value of  $Q'$ .

1    16.   The method according to claim 14, wherein said multiplication of said second intermediate  
2    quotient ( $Q''$ ) by 9 is accomplished by:

3           shifting said binary representation of  $Q'$  to the left by 5 places to define a first shifted  $Q'$   
4           value,  
5           shifting said binary representation of  $Q'$  to the left by 4 places to define a second shifted  $Q'$   
6           value; and  
7           adding said first and second shifted values of  $Q'$  to the original value of  $Q'$ .



1 17. A system for generating communication frequencies in a wireless interface system that  
2 services communications between a wirelessly enabled host and at least one user input device,  
3 comprising:

4 a wireless interface unit that wirelessly interfaces with the wirelessly enabled host, wherein

5 the wireless interface unit comprises:

6 an analog module including a transceiver unit and a frequency synthesizer,

7 a baseband module including a frequency hopper, wherein said frequency hopper is

8 operable to generate a plurality of frequencies related to a modulo 23

9 solution of an input variable, wherein said frequency hopper generates an

10 intermediate modulo 23 solution by:

11 generating a binary representation of said input variable;

12 using the five rightmost digits of said binary representation of said input

13 variable to represent a first intermediate remainder ( $R'$ );

14 using the remaining three leftmost digits to represent a first intermediate

15 quotient ( $Q'$ );

16 expressing said first intermediate modulo solution as a sum of said first

17 intermediate quotient ( $Q'$ ) multiplied by 9 plus said first intermediate

18 remainder ( $R'$ );

19 comparing said first intermediate modulo solution to the quantity 32; and

20 indicating said first intermediate remainder ( $R'$ ) as the modulo remainder

21 ( $R$ ) if said quantity of said first intermediate modulo solution is less

22 than 32; and

wherein said frequency synthesizer is operable to generate a frequency hop sequence using said result of said modulo 23 solution generated by said frequency hopper.

18. The system according to claim 17 wherein an iterative process is performed if said first intermediate modulo solution is greater than 32; said iterative process comprising:

- (a) generating a binary representation of said first intermediate modulo solution;
- (b) using the five rightmost digits of said binary representation of said first intermediate modulo solution to represent a second intermediate remainder ( $R''$ )
- (c) using said remaining three leftmost digits to represent a second intermediate quotient ( $Q''$ );
- (d) expressing said second intermediate modulo solution as a sum of said second intermediate quotient ( $Q''$ ) multiplied by 9 plus said second intermediate remainder ( $R''$ );
- (e) comparing said second intermediate modulo solution to the quantity 32;
- (f) indicating said second intermediate remainder ( $R''$ ) as the modulo remainder ( $R$ ) if said quantity of said second intermediate modulo solution is less than 32; and
- (g) repeating steps (a) through (f) if said intermediate modulo solution is greater than 32 and continuing until the intermediate modulo solution is less than 32.

19. The method according to claim 17, wherein said multiplication of said first intermediate quotient ( $Q'$ ) by 9 is accomplished by:

shifting said binary representation of  $Q'$  to the left by three places; and

4 adding said left-shifted value of  $Q'$  to the original value of  $Q'$ .

1 20. The method according to claim 18, wherein said multiplication of said second intermediate  
2 quotient ( $Q''$ ) by 9 is accomplished by:

3 shifting said binary representation of  $Q''$  to the left by three places; and

4 adding said left-shifted value of  $Q''$  to the original value of  $Q''$ .

1 21. A system for generating communication frequencies in a wireless interface system that  
2 services communications between a wirelessly enabled host and at least one user input device,  
3 comprising:

4 a wireless interface unit that wirelessly interfaces with the wirelessly enabled host, wherein

5 the wireless interface unit comprises:

6 an analog module including a transceiver unit and a frequency synthesizer,

7 a baseband module including a frequency hopper, wherein said frequency hopper is

8 operable to generate a plurality of frequencies related to a modulo 79

9 solution of an input variable, wherein said frequency hopper generates an

10 intermediate modulo 79 solution by:

11 generating a binary representation of said input variable;

12 using the seven rightmost digits of said binary representation of said input variable to

13 represent a first intermediate remainder ( $R'$ );

14 using the remaining leftmost digits to represent a first intermediate quotient ( $Q'$ );

15 expressing said first intermediate modulo solution as a sum of said first intermediate

16 quotient ( $Q'$ ) multiplied by 49 plus said first intermediate remainder ( $R'$ );

17 comparing said first intermediate modulo solution to the quantity 128; and  
18 indicating said first intermediate remainder (R') as the modulo remainder (R) if said  
19 quantity of said first intermediate modulo solution is less than 128.

1 22. The system according to claim 21 wherein an iterative process is performed if said first  
2 intermediate modulo solution is greater than 128, said iterative process comprising:

- 3 (a) generating a binary representation of said first intermediate modulo solution;
- 4 (b) using the seven rightmost digits of said binary representation of said first  
5 intermediate modulo solution to represent a second intermediate remainder (R'')
- 6 (c) using said remaining leftmost digits to represent a second intermediate quotient  
7 (Q'');
- 8 (d) expressing said second intermediate modulo solution as a sum of said second  
9 intermediate quotient (Q'') multiplied by 49 plus said second intermediate remainder  
10 (R'');
- 11 (e) comparing said second intermediate modulo solution to the quantity 128;
- 12 (f) indicating said second intermediate remainder (R'') as the modulo remainder (R) if  
13 said quantity of said second intermediate modulo solution is less than 128; and
- 14 (g) repeating steps (a) through (f) if said intermediate modulo solution is greater than  
15 128 and continuing until the intermediate modulo solution is less than 128.

1 23. The system according to claim 22, wherein said multiplication of said first intermediate  
2 quotient (Q') by 49 is accomplished by:

3 shifting said binary representation of Q' to the left by 5 places to define a first shifted Q'

4 value,  
5 shifting said binary representation of  $Q'$  to the left by 4 places to define a second shifted  $Q'$   
6 value; and  
7 adding said first and second shifted values of  $Q'$  to the original value of  $Q'$ .

1 24. The system according to claim 14, wherein said multiplication of said second intermediate  
2 quotient ( $Q''$ ) by 9 is accomplished by:

3 shifting said binary representation of  $Q'$  to the left by 5 places to define a first shifted  $Q'$   
4 value,  
5 shifting said binary representation of  $Q'$  to the left by 4 places to define a second shifted  $Q'$   
6 value; and  
7 adding said first and second shifted values of  $Q'$  to the original value of  $Q'$ .